ISBN 978-83-959742-8-1

Transport Problems 2024

Conference proceedings

UNDER THE HONORARY PATRONAGE OF

Silesian University of Technology

Krajowa Reprezentacja Doktorantów

KRD

XVI INTERNATIONAL SCIENTIFIC CONFERENCE

19-21.06 2024

Katowice - Ojców National Park

17-18.06 2024

Katowice

XIII INTERNATIONAL SYMPOSIUM OF YOUNG RESEARCHERS

Silesian University of Technology
Faculty of Transport and Aviation Engineering

Transport Problems 2024

Proceedings

XVI International Scientific Conference
XIII International Symposium of Young Researchers

UNDER THE HONORARY PATRONAGE OF

Silesian University of Technology

Krajowa Reprezentacja Doktorantów KRD

ISBN 978-83-959742-8-1

Media patronage:
Transport Problems International Scientific Journal
ISSN 1896-0596, The Silesian University of Technology,
Faculty of Transport and Aviation Engineering

Transport Problems
International Scientific Journal

Keywords: prospects; international transport corridors; transit potential; territory; transit; regional integration; priority routes

Assem UTEGENOVA*
Kazakh National Research Technical University named after K.I. Satpayev
Satbayeva 22, 50013 Almaty, Kazakhstan
Aleksander SŁADKOWSKI
Silesian University of Technology
Krasińskiego 8, 40-019 Katowice, Poland
Ivan STOLPOVSKIKH, Damir KRAMSAKOV
Kazakh National Research Technical University named after K.I. Satpayev
Satbayeva 22, 50013 Almaty, Kazakhstan
**Corresponding author*. E-mail: utegenovaassema@gmail.com

PROSPECTS AND OPPORTUNITIES FOR TRANSPORTATION AND LOGISTICS CORRIDORS THROUGH KAZAKHSTAN

Summary. Today there is a tendency to integrate Kazakhstan's transportation system into the new architecture of transcontinental transport corridors of Eurasia. As a consequence, there are problems in increasing the investment attractiveness of transport logistics. This article is devoted to the study of the processes of formation and effective use of new logistics, the development of transport and transit potential of Kazakhstan, the modernization of transport corridors in the region, and the improvement of the quality of transportation between Central Asia and Europe. The analysis and substantiation of the formation of global chains of logistics systems of international trade in Kazakhstan has been carried out. Priorities and the necessity of creating multilevel transport and logistics corridors in the territory of the Republic of Kazakhstan are identified. Such methods of scientific analysis as comparative-economic and statistical, system-functional, and theory of management of organizational and economic systems were used in the work. The results of the formation of transcontinental transport corridors, in which Kazakhstan can play the role of not only a key link in the chain of continental service but also the designer of architecture. It is revealed that the digital transformation of supply chain management is the main tool to improve the efficiency of transport corridors throughout Kazakhstan. Within the framework of scientific novelty, a number of basic elements of digital transformation and digital solutions are outlined. The article highlights the main aspects and prospects for the development and supply chain management of the emerging multimodal Eurasian transcontinental corridor.

1. INTRODUCTION

The modern transportation system of Kazakhstan is represented by five international transportation corridors:

- Northern and Southern corridors of the Trans-Asian Railway - Northern: Western Europe-China, Korea, Japan through Russia and Kazakhstan (Dostyk-Astana-Petropavlovsk section);
- Southern: Southeast Europe-China-Southeast Asia via Turkey, Iran, Central Asia and Kazakhstan (Dostyk-Saryagash section);
- Central Asian corridor. Central Asia-Russia and EU countries (section along RK Saryagash-Arys-Kandagach-Ozinki);

- North-South corridor. Northern Europe - Persian Gulf countries through Russia and Iran with participation of Kazakhstan on the section of Aktau seaport - Ural and Aktau - Atyrau regions);

- TRACECA. Eastern Europe-South Caucasus-Caspian Sea-Central Asia [1].

Regular rail service along the corridor routes to Europe has the potential to change the economy of Kazakhstan, which is the most developed economy in Central Asia and its location is crucial for international and local logistics companies. Kazakhstan's oil exports have increased in recent years and the country has become attractive to foreign, including Chinese, investment in the oil sectors, and the improvement of infrastructure on Kazakhstan's GDP is estimated at about 6.5 percent.

Modernizing Kazakhstan's transport corridors to reduce freight delivery times leads to increased foreign direct investment and exports, which in turn increases their productivity, increases GDP, lowers the price of imported inputs, and reduces production costs, leading to a reallocation of specialization within and across countries and increasing productivity growth. The impact of such improvements in trade facilitation and infrastructure logistics on Kazakhstan's GDP is estimated at 15 percent, bringing the total benefit of improved infrastructure, trade policy and facilitation to 21 percent.

To reduce delays at the borders of transport corridors, it is necessary to reform the procedures for cargo crossing. All of Kazakhstan's border-crossing performance indicators emphasize existing deficiencies in trade facilitation and logistics. While membership in the Eurasian Economic Union does not allow Kazakhstan to unilaterally reduce tariffs, it is possible to unilaterally simplify trade facilitation procedures, improve logistics, and open up to services. Kazakhstan could also consider using an electronic customs declaration system by creating an electronic platform for the simultaneous submission and synchronized processing of trade and logistics-related documents.

In order to reduce transport costs and reduce border crossing time, it is necessary to modernize 6 major border crossing points. This point is reflected in the Joint Action Plan and Roadmap for the development of checkpoints on the Kazakhstan-Russia border for 2023-2027. The capacity of the checkpoints will increase 3 times, and the transit cargo transit time will be reduced by half. The total volume of cargo transportation by all types of transport in the Republic of Kazakhstan for 2023 amounted to 640.8 million tons, of which: rail transportation - 273 million tons; road transportation - 184 million tons, with an income of more than 1 trillion tenge [1-3].

In the field of telecommunications in Kazakhstan there are existing restrictions on foreign investors' ownership of up to 49 percent or less of shares of companies, while granting long-term exclusive rights to traditional operators for a long period of time.

The problems of the Central Trans-Caspian Network (CTCN) at present are: insufficient transportation infrastructure and poor transport accessibility, which creates serious obstacles to the development of the region. Recognizing the need for change, the EU envisages an integrated transport network that addresses infrastructure gaps and bottlenecks. The above determines the relevance and practical necessity of the present study, which is devoted to the study, research and solution of issues on improvement of chain management of logistics system of transport corridors through Kazakhstan.

The purpose of this research is to conduct an analytical review and develop conceptual proposals for the formation of international transport corridors through Kazakhstan.

The purpose of this research is to conduct an analytical review and develop conceptual proposals for the formation of international transport corridors through Kazakhstan.

The results of fundamental and applied research in the field of functioning of transport and logistics corridors served as a methodological and methodological basis for the work.

The research methodology is based on scientific methods (analysis, synthesis, classification), which allow to form a general picture on the justification of the architecture of transcontinental transport corridors through Kazakhstan using the basic provisions of structural and situational analysis with the involvement of statistical methods of data processing.

The research objectives included: research and retrospective analysis of the state of internal and external factors of international transport corridors; identification of risks, including those associated with competition in the world markets of transport and logistics services; development of ways and mechanisms for the development of transport corridors based on the analysis of statistics, forecasts,

internal and external factors; description of prospects for the development of international transport corridors and their individual links.

2. DEVELOPMENT PERSPECTIVES

Of particular relevance in the development of transport and transit potential of the Central Asian countries is the direction of formation and development of the Trans-Caspian International Transport Route (TITR), which provide opportunities to reorient the trade routes of Kazakhstan to Europe, bypassing Russia, caused by large-scale sanctions, which Western countries continue to introduce and expand and Southern [3].

In this situation a number of problems arise, how to build trade and transportation routes, what actions may lead to sanctions, what actions will not lead to sanctions. Today it is an opportunity for Kazakhstani business to build its strong right chain using exactly Kazakhstani assets, as far as terminals and transportation facilities are concerned.

Realizing such objectives requires equal and fair access to networks for all regional players, as well as coordinated investments in domestic networks aligned with international corridors. Kazakhstan's unique geographic position spanning Europe and Asia provides an opportunity to become a critical link in global trade routes. By capitalizing on the potential of the Middle Corridor, which passes through major Central Asian cities including Almaty, Bishkek, Shymkent, and Tashkent, the region can contribute to economic growth and regional integration.

Within the framework of the “One Belt, One Road” initiative, a particularly important role is assigned to the international logistics system of Kazakhstan, the main purpose of which is the creation or modernization of transport corridors through Kazakhstan (Figs. 1, 2) [4].

The figures show that the Northern and Southern Corridors are the Russian Trans-Siberian Railway, extended to Beijing and Dalian. Central or Central Asian Corridor (Eurasian route), which runs from Lanzhou in central China and through the Kazakhstan “dry port” of Khorgos, where cargoes must be unloaded to accommodate different rail gauges before branching north to the Russian route or south to connect to the rail corridor. TRACECA - Eastern Europe - South Caucasus - Caspian Sea - Central Asia. Trans-Caspian International Transport Route (TITM) connecting Kazakhstan, Azerbaijan, Georgia and Turkey across the Caspian Sea. The attractiveness of this southern branch has increased since the outbreak of war in Ukraine, as European shippers try to avoid crossing Russian territory for fear of sanctions. This part could be extended further to include Iran in the future, reducing transit time by bypassing the Caspian Sea crossing and possibly even connecting to the India-backed International North-South Transport Corridor (INSTC) [4-6].

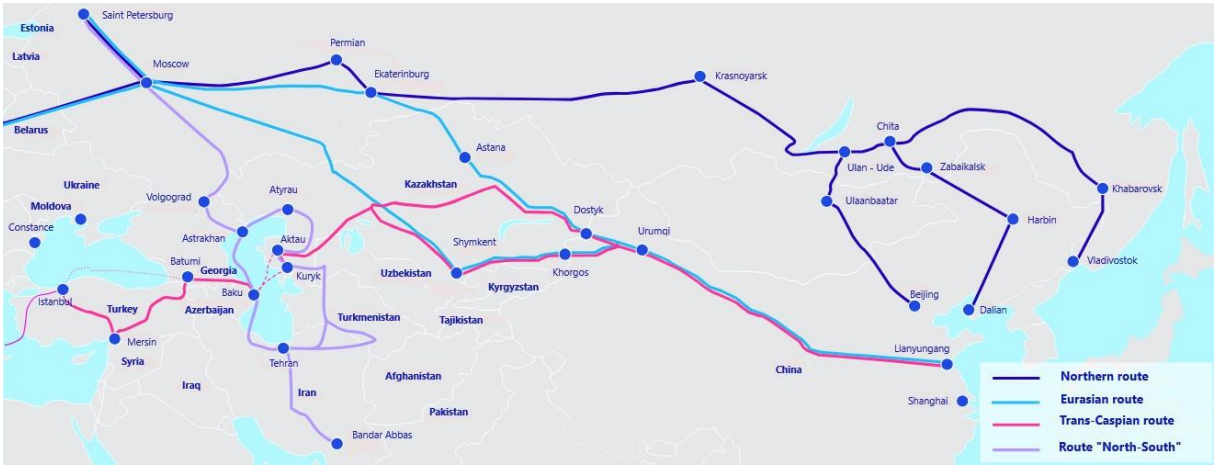


Fig. 1. Transport corridors in Kazakhstan and neighboring countries [4]

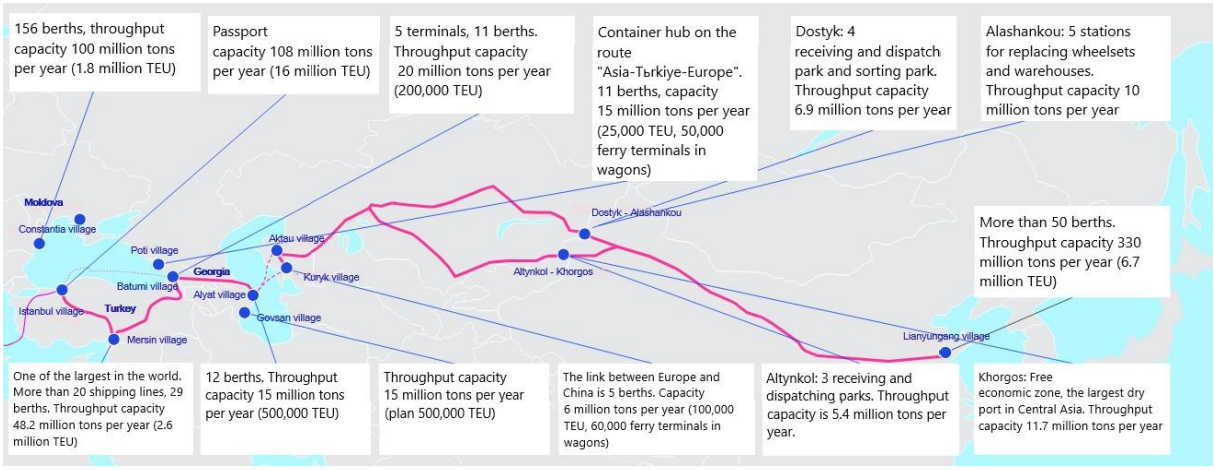


Fig. 2. Throughput capacity of existing logistics centers [4]

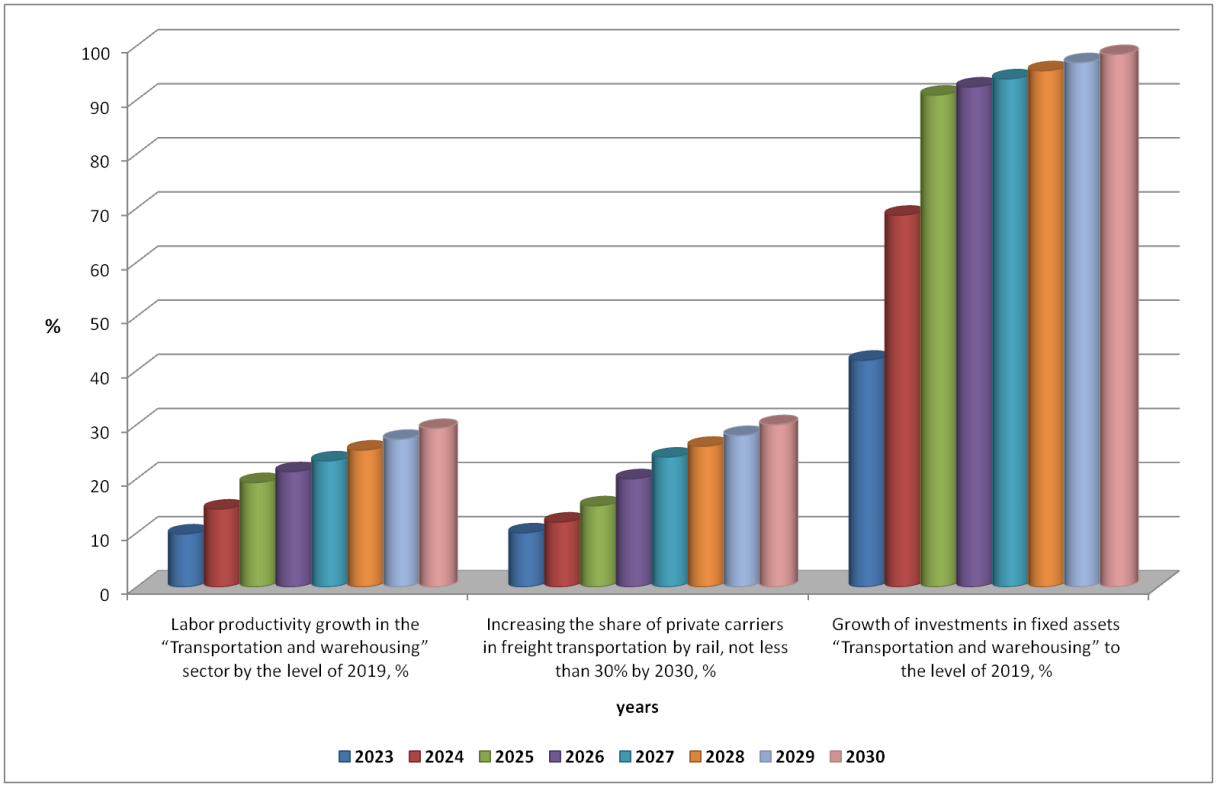
Based on the results of the analysis of the operation of transport corridors and throughput capacity of logistics corridors (Figures 1, 2), the main sectoral problems hindering the integrated development of the transport and logistics industry and the development of the transit potential of transport corridors through Kazakhstan have been identified.

The identified problems are inter-sectoral in nature, in particular: insufficient capacity of international transit-transport corridors, transport hubs, logistics terminals and checkpoints; the presence of non-physical barriers in international transport communication; insufficient level of development of “soft infrastructure”, digitalization and automation for multimodal transportation management, data and document exchange between participants of the transportation process; non-compliance of transport infrastructure with the requirements of the international transport corridors; inadequate level of “soft infrastructure”, digitalization and automation for multimodal transportation management, data and document exchange between participants of the transportation process.

In order to achieve the strategic goal of Kazakhstan becoming a leading regional transit hub by 2030 and to ensure the integrated development of individual sectors of transport within a single transport and logistics complex, measures will be implemented in the following areas:

- development of cross-border hubs and terminal network to attract additional transit volumes of multimodal transportation;
- increasing the capacity of international transit-transport corridors, logistics terminals and checkpoints;
- modernizing and increasing the number of transport vehicles fleet, including cargo road, rail, sea and air transport;
- elimination of non-physical barriers in international transport communication;
- simplification of customs administration of the process of cargo transportation in international traffic;
- improvement of national legislation and conclusion of new interstate agreements in the field of transport, transit and trade.

Fig. 3 shows the target indicators for the development of transport and logistics corridors through Kazakhstan for the period up to 2030 [7].



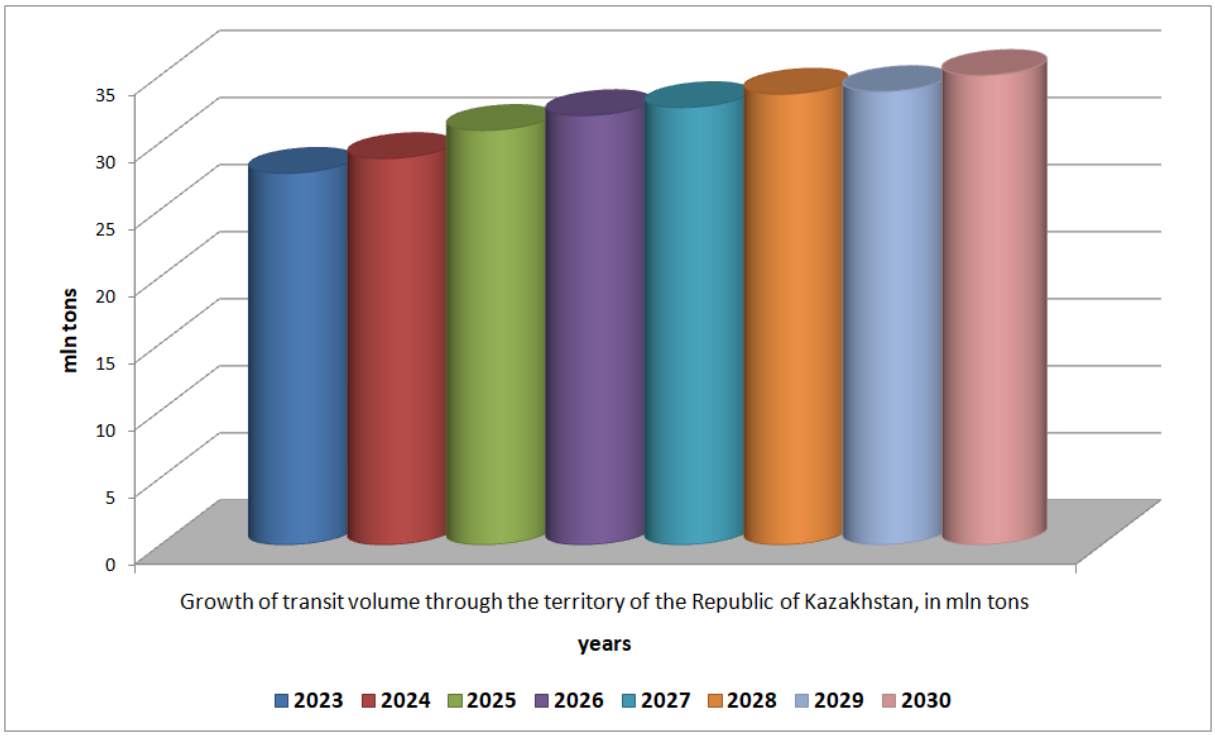


Fig. 3. Target indicators for the development of transport and logistics corridors through Kazakhstan for the period up to 2030

Target indicators by 2030:

1. Productivity growth in the transport and warehousing sector by 2019 (2023 - 9.8%, 2024 - 14.4%, 2025 - 19.3%, 2026 - 21.3%, 2027 - 23.3%, 2028 - 25.3%, 2029 - 27.3%, 2030 - 29.3%).

2. Growth of investment in fixed capital "Transport and warehousing" to the level of 2019 (2023 - 41.9%, 2024 - 68.7%, 2025 - 90.90%, 2026 - 92.4%, 2027 - 93.9%, 2028 - 95.4%, 2029 - 96.9%, 2030 - 98.4%).

3. Bringing and maintaining 100% of the network of international and republican roads in the normative technical condition (2023 - 92%, 2024 - 93%, 2025 - 94%, 2026 - 95%, 2027 - 96%, 2028 - 97%, 2029 - 100%, 2030 - 100%).

4. Bringing and maintaining at least 95% of the regional and district road network in a normative technical condition (2023 - 86%, 2024 - 87%, 2025 - 88%, 2026 - 90%, 2027 - 92%, 2028 - 94%, 2029 - 95%, 2030 - 95%).

5. Increase in the share of private carriers in the transportation of goods by rail, not less than 30% by 2030 (2023 - 10%, 2024 - 12%, 2025 - 15%, 2026 - 20%, 2027 - 24%, 2028 - 26%, 2029 - 28%, 2030 - 30.0%);

6. Growth of transit volume through the territory of the Republic of Kazakhstan, in mln. tons (2023 - 27.7 mln. tons, 2024 - 28.8 mln. tons, 2025 - 30.9 mln. tons, 2026 - 32 mln. tons, 2027 - 32.6 mln. tons, 2028 - 33.6 mln. tons, 2029 - 33.8 mln. tons, 2030 - 35 mln. tons), including container transit, in mln. tons), including container transit, in thousand TEU (2023 - 1,250 thousand TEU, 2024 - 1,348 thousand TEU, 2025 - 1,464 thousand TEU, 2026 - 1,556 thousand TEU, 2027 - 1,590 thousand TEU, 2028 - 1,727 thousand TEU, 2029 - 1,865 thousand TEU, 2030 - 2,000 thousand TEU).

7. Share of republican highways provided with mobile communication on standard not lower than 3G, with Internet access, in % (2023 - 40%, 2024 - 50%, 2025 - 60%, 2026 - 70%, 2027 - 80%, 2028 - 90%, 2029 - 100%, 2030 - 100%).

8. Decrease in the share of risk of hydrodynamic accidents at shipping locks. % (2023 - 54,6%, 2024 - 54,4%, 2025 - 53,2%, 2026 - 52,7%, 2027 - 52,2%, 2028 - 51,7%, 2029 - 51,2%, 2030 - 50,7%).

9. Reduction in wear and tear of the technical fleet, in % (2023 - 65%, 2024 - 63%, 2025 - 61%, 2026 - 60%, 2027 - 58%, 2028 - 57%, 2029 - 55%, 2030 - 54%).

10. Share of railway rolling stock (passenger cars) with a service life of more than 25 years, in % (2023 - 27.9%, 2024 - 24.8%, 2025 - 19.9%, 2026 - 8.8%, 2027 - 4.4%, 2028 - 2.1%, 2029 - 3.5%, 2030 - 3.2%) [7].

Some €18.5 billion ($20 billion) is needed to renew and modernize the region's transport infrastructure. These investments will cover such important areas as rehabilitation and expansion of railways and roads, improvement of port capacity, modernization of border crossing points and creation of modern multimodal logistics centers.

Successful realization of the set goals requires not only declaring interests and mutual benefits for all countries falling into the orbit of this initiative, but also improving supply chain management of Kazakhstan's transport logistics system in the new economic reality.

Due to these objective reasons, the issues of improving transportation corridors through Kazakhstan need to formulate new drivers of sustainable economic growth and a comprehensive strategy for the development of the international logistics industry to ensure effective supply chain management of the logistics system of Kazakhstan.

The article presents an overview of scientific concepts and approaches in the field of supply chain management, presents the main logistics projects of Kazakhstan implemented within the framework of the “One Belt - One Road” initiative, provides forecast data for the development strategy and suggests possible ways to improve supply chain management through logistics corridors of Kazakhstan.

3. LITERATURE REVIEW

Many specialists and scientists, both in CIS countries and abroad [8-11], have studied the problems of development and location of transport and logistics corridors. These studies contain elaborations of methodological approaches to the study of problems of development of transport and logistics systems of megacities on the basis of specialized approaches and the role of transport corridors in the economic

development of participating countries, generalized the experience of formation of transport systems of Central Asian countries, giving priority to the development of transport corridors China-Europe.

With its strategic pivot towards Central Asia, the European Union is increasingly asserting its interests in the region. This was evident during the second EU-Central Asia Economic Forum, where Valdis Dombrovskis, Executive Vice President of the European Commission, emphasized the EU's intention to explore new trade routes and opportunities connecting Central Asia and the EU. He emphasized the need to invest in transport solutions and infrastructure development, signaling a clear EU commitment to strengthening regional ties [10]. The author of this publication notes that the European Bank for Reconstruction and Development (EBRD) has adopted a strategy for Kazakhstan for 2022-2027 that prioritizes promoting private sector competitiveness and transport connectivity, financing transport and logistics infrastructure, including roads, warehouses and dry ports, including through the Global Gateway Initiative.

However, as the One Belt, One Road initiatives are constantly evolving and changing, no study to identify and justify the architecture of Eurasia's transcontinental transport corridors has been completed, leading to further study of the above issues.

Kazakhstan has the potential to develop transit corridors through its territory. According to Kazakhstani experts, 10-12% of GDP in the member countries of the Eurasian Economic Community is generated by logistics. In the EU this figure is 20-25%. A developed network of transit routes has been created through Kazakhstan.

One of the tools for logistics development in the Republic of Kazakhstan is the development of logistics infrastructure (logistics centers, logistics parks, logistics zones, distribution centers, warehouses, etc.). According to the Transport Strategy of the Republic of Kazakhstan until 2030 and the State Program of Development and Integration of Transport Infrastructure of the Republic of Kazakhstan until 2050, it is planned to create transport and logistics centers (TLC) in all regions of Kazakhstan with the expansion of transport and logistics services.

By 2030, the volume of transit through the territory of Kazakhstan will be increased to 35 million tons. Such indicators are stipulated by the approved Concept for the development of transport and logistics complex [12]. The above review notes that one of the important tasks is to develop a comprehensive strategy for the development and modernization of the TLC infrastructure at the national and regional levels. First of all, it is necessary to determine the strategic directions of development of all types of transport, providing economically efficient and technologically diverse transport links between industrial production, settlements, regions and industries at both national and international levels.

Within Kazakhstan, its regions are separated by long distances, making better transportation necessary. Internationally, it is landlocked and remote from seaports, so good cross-border transport depends not only on the quality of its own transport network, but also on the transport network of its neighbors.

The analysis in this article focuses on transport links and the economy; however, other infrastructure will also be important for countries to take advantage of improved transport connectivity, and this article provides some information on infrastructure and challenges in transit corridors through Kazakhstan.

4. RESULTS

When assessing the concept of development of the TLC network passing through Kazakhstan, the specifics and characteristics of goods characteristic of this region, as well as the advantages and prospects for the development of international transport corridors were taken into account. The assessment was carried out in three main priority areas of TLC development: transit, domestic and export.

The strategy of integration of Kazakhstan's transport system into the new architecture of Eurasia's transcontinental transport corridors involves concerted actions to modernize the institutional

framework of the transport industry, introduce effective business models and management systems for the industry and related sectors, and increase the investment attractiveness of transport logistics.

An integrated transport and logistics network of transport corridors is a unified logistics solution linking transit flows between Europe, Central Asia and China. The routes can become a continental bridge between the largest markets, halving freight transportation time and significantly reducing transportation costs. Kazakhstan first announced the One Belt, One Road (OBOR) initiative ten years ago, and it is a critical component of this strategy. Kazakhstan has made consistent efforts to serve as a transportation and logistics hub of international importance. For example, Kazakhstan accounts for about 85% of all land transit traffic from China to Europe. Kazakhstan plans to lay 1,300 kilometers of new railroad tracks in three years, and there are already projects in place that will help bring our infrastructure capacity in line with the positive outlook in the study's estimates. We can expect that the signing of the memorandum and cooperation with such large companies will allow Kazakhstan to play a key role in freight transportation and transit through Kazakhstan.

Currently, Kazakhstan's transportation system plays an important role due to such factors as the country's large area (2,724,900 square kilometers), stretching from west to east for about 3,000 km and from north to south for almost 2,000 km; low population density - 5.5 people per 1 square kilometer; significant long-distance freight transportation; the nature of products requiring long-distance transportation [coal, iron ore, petroleum products, products of metallurgical industry and agriculture (grain, wool, meat)]; the low density of the population (5.5 people per 1 square kilometer); and the high cost of transportation. km; significant long-distance freight transportation; the nature of products requiring long-distance transportation [coal, iron ore, oil products, products of metallurgical industry and agriculture (grain, wool, meat)]; transport and geographical position of the country, through which significant flows of transit cargoes are transported[13].

Kazakhstan launched its own transport modernization program more than fifteen years ago, funded by huge oil revenues.

Kazakhstan has also built and/or modernized north-south cross-border rail routes. One connects Uzen in the north to Russia and south to Iran through cities in northwest Kazakhstan and Turkmenistan, traveling along the eastern shore of the Caspian Sea. The other connects Aktobe in the north to western Russia and south to Afghanistan via cities in southern Kazakhstan and Uzbekistan.

Sixty-two percent of all transportation revenues are generated from international destinations, which indicates the modernization and improvement of the quality of the transport and logistics infrastructure serving international freight traffic, especially transit traffic.

In this regard, “breakthrough” projects are needed to maximize the use of the country's transit potential. The reconstructed new transport corridor “Western Europe - Western China” meets these requirements; its total length is 8,445 km, of which the Kazakhstan section is 2,787 km, 2,233 km on the territory of the Russian Federation, and 3,425 km on the territory of China. The project cost of the Kazakhstan section is 5.65 billion US dollars. The implementation of the project allows redirecting part of the movement of Chinese goods from sea transport to road transport (45 days by sea versus 11 days by road through Kazakhstan).

Problematic issues of the existing TLC infrastructure are: weak material and technical base; weak coordination, regulation and planning of cooperation of market participants; government policy (tariffs, pricing, investments; imperfect regulatory documents and inconsistency of national legislation with international standards; lack of financing; low quality of services; low competence of experts and market imperfection.

Based on these problems, it is possible to group the main directions of development of future projects of location and development of transport and logistics corridors (TLC) through Kazakhstan.

It is advisable to specialize in the development of transport and logistics corridors in the regions, taking into account the specifics and properties of goods (cargoes) characteristic of the countries of the region.

The existing terminal warehouses in the country can at best be specialized, mainly for cargo handling, storage and distribution. However, they do not meet modern requirements in terms of technical capabilities and equipment, as well as they are not located systematically, without mutual reference to each other, sometimes without connection to transportation and information

communications networks, and are used only for temporary storage. In this regard, it is impossible to ensure the integrity of the supply chain with the provision in one place of a set of transport, technological, customs and related services, the implementation of which could be carried out in the territory of the TLC.

According to the analysis, the main directions of transport development in the long-term perspective up to 2030 are: improvement of the system of state regulation and management; increase of transit potential and its effective use; maximum assistance to the development of domestic entrepreneurship, cost reduction in domestic, export and import transportation; development of infrastructure, science and technology; ensuring transport security; training and retraining of personnel; multimodal technologies of pedestrian transportation; and the development of transport infrastructure.

Using European experience, the backbone of the system will be based on a network of border TLCs, of which the most important will be the Eastern Gateway - Khorgos and Dostyk, the Western Gateway - the port of Aktau, as well as TLCs that are located in places where export and transit transport interchanges occur, they will work to attract cargo flows through Kazakhstan, mainly from China and South - East Asia to Europe and Russia.

All these TLCs should be integrated into regional logistic transport and distribution systems based on the formation of a unified system of organizational, economic, informational and legal support of cargo control and goods movement.

Their formation can take place on the basis of existing transport companies and warehouses, commodity yards and railway-sorting complexes in the areas of cities with high freight transportation potential in large industrial areas, such as Karaganda, Ust-Kamenogorsk, Semey, Taraz, etc.

Integration into the global transportation and logistics network is carried out through the development of a network of TLCs in the Republic of Kazakhstan, interaction with external TLCs and the EurAsEC network.

Taking into account that Kazakhstan is one of the six world grain exporters, the creation of grain terminals in TLC ports with the participation of Kazakhstan is justified. Integration of all domestic TLCs into a single system will become a key tool for international level development.

Currently, there is a tendency worldwide to outsource many transportation and logistics functions to logistics companies, which reduces logistics costs. Domestic companies are not an exception and should follow the same trend.

In addition, in our opinion, the creation of a law on the activities of TLC in Kazakhstan will allow to determine the degree of state participation in logistics projects; to develop the structure of TLC; mechanisms for their inclusion in various logistics companies; distribution of orders between participants; the order of formation of top management, etc.[14, 15].

5. DISCUSSIONS

The transportation sector is one of the basic industries in Kazakhstan and accounts for about 8% of GDP (in the USA and Canada-12.7%, in Western Europe-8.3%, in Japan-5.4%). The employment rate is 7.0% of the total employed population of the country; Fixed assets of the transportation sector account for 14% of the country's fixed assets. The turnover of the transport sector is rapidly increasing due to dynamic passenger and freight transportation.

Internal connectivity of the largest cities has improved in recent years: Almaty and Astana have access to modernized rail and road links with each other, as well as with cities on the other side of the border. Almaty, Astana and Shymkent are connected to Tashkent by rail and road, to Bishkek by a modern road, and to Dushanbe by a less developed but adequate multimodal rail and road route. Kazakhstan's energy infrastructure in terms of generation, transmission and distribution is in better condition than in other Central Asian countries, but faces the challenge of mobilizing significant investment over the next decade to meet broadband and affordable Internet access.

The regulatory framework needs to be improved. There are regulatory restrictions on the ownership of fixed telecommunications by foreign entities, which limits the number of operators that can own

their own international gateways (currently only two, both owned by the state). The state still owns a significant share of the telecommunications sector, and telecommunications companies are legally obliged to connect to the state network. Although an open access policy exists, its enforcement is sporadic. Weak tariff regulation leads to expensive transit prices and hurts downstream service providers.

Since independence, Kazakhstan has made great efforts to develop its transport and transit potential and modernize transport corridors, allocating more than $35 billion over the past 15 years for this purpose.

The analysis shows that the bulk of European investment (more than 50 percent) is in the mining sector, particularly oil and gas extraction. At the same time, transportation and storage accounted for only 5 percent. Thus, despite Europe's stated interest in expanding Central Asian integration corridors, the level of investment in infrastructure transportation projects in the region is low.

The focus of Europe and China on developing different corridors can help Central Asian countries diversify transport routes for exports and imports. Kazakhstan and Central Asian countries can benefit from the institutionalization of these mechanisms as they will be able to promote complementary projects on both platforms.

Among all modes of transport, rail transport on Euro-Asian routes has great potential to become more competitive in terms of travel time and fares. Transport operators need to speed up delivery times and improve service quality to meet demand, and governments and investors need to modernize infrastructure and harmonize national legislation.

The estimated benefits from improving Kazakhstan's transport corridor infrastructure depend on improvements being made to the entire transport network. This requires increased cooperation between countries. Harmonization and standardization of procedures with corridor countries will lead to interoperability, which is necessary for efficient and effective trade and transport flows along the corridor.

The development of logistics in Kazakhstan is influenced primarily by the high dynamics of economic development, which requires an appropriate evolution of the transportation system capable of effectively serving the logistics needs of the economy. In recent years, the number of logistics and freight forwarding companies has grown by 76% to reach 92. Almost 60% of them are located in Almaty. 80% of transit cargo is handled in Almaty due to the lack of warehousing infrastructure and then sent back to the regions.

One of the key sectors of the economy is transport and logistics corridors through Kazakhstan (TLC), which include rail, road, aviation, water transport modes, as well as transport logistics. Their development has a multiplicative effect on the economy, facilitates production processes, contributes to the increase in domestic and foreign trade of the country, strengthens inter-sectoral and interregional ties, and replenishes the revenue part of the state budget.

The results of the study showed that geographical location alone is not enough to integrate the country into the global East-West transport corridor, which connects Asia and the European Union countries. In order for transit cargo flows to move to the transport system of Kazakhstan, firstly, it is necessary to significantly increase the overall level of development of the domestic transport and logistics system and its infrastructure, to modernize and significantly expand the capacity of Kazakhstan's transport corridors, as well as to ensure the transparency of transport tariffs and mechanisms for their control and regulation.

At the same time, attention should be paid to improving and increasing the efficiency of existing networks, management of transport infrastructure, as well as motivating regional authorities to increase the intensity of its use. Based on the analysis of the problems of logistics infrastructure development, the necessity to create a multilevel network of transport and logistics infrastructure in Kazakhstan was substantiated, which today lags behind in the application of modern transport technologies, and the technical and economic characteristics of a large number of operating vehicles are far below international parameters.

The development of Kazakhstan's TLC is influenced by two powerful external factors: on the one hand, the European-Asian Economic Union (EAEU), which unites five countries, and on the other

hand, China's “One Belt, One Road” initiative. They will determine the prospects for the development of international transportation with the participation of Kazakhstan in the near future.

Digitalization is recognized as the most important factor in the development of TLC. Since the key criteria of competitiveness in the supply chain are cost and time, the movement of cargo should be clearly monitored and, if necessary, promptly regulated along the entire chain from the beginning to the end of delivery. In the future, we can expect the formation of transcontinental transportation corridors, in which Kazakhstan can play the role of not only a key link in the chain of continental service, but also the designer of architecture. The emerging multimodal Eurasian transcontinental corridor may include a network of supporting LCs and regional logistics distribution platforms interacting with them[16].

For the effective realization of Kazakhstan's transport potential, it is necessary to develop all types of transport in a planned manner. Not only transportation, but also the development of regions as a whole, solution of social problems such as employment, reduction of inflationary pressure on prices, improvement of quality and standard of living are connected with transport. The way to realize the transit potential is through modernization of the transport and logistics system of the country.

6. CONCLUSIONS

The strategy of integration of Kazakhstan's transport system into the new architecture of Eurasia's transcontinental transport corridors implies a comprehensive impact on the complex and dynamic trans-continental system to coordinate actions aimed at modernizing the institutional framework of the transport industry, introducing effective business models and management systems for the industry and chain-related sectors, and increasing the investment attractiveness of transport logistics.

It is concluded that the development of international transport corridors through Kazakhstan for transit cargo flows cannot be ensured without the use of the latest digital technologies, which are an integral part of the transition to sustainable flows along transport corridors.

Creation of a reliable management system for the network of international transport corridors is a necessary basis for their smooth and efficient operation. Optimization of communication, logistics, control and licensing functions will increase the transparency of the transport network, favoring international cooperation and improving the integration of transport with other sectors, facilitating the movement of goods and services across borders.

This study was funded by the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant No. AR 19675410).

References

1. Special Project “Transport Systems of the EAEC Countries” (Kazakhstan), No. “Logistics.by” 5/2023. Available at: https://www.beltamojizdat.by/products/articles/spetsproekt-transportnye-sistemy-stran-eaes/.
2. *Transport and logistics potential of the Republic of Kazakhstan*. March 15, 2023. Available at: https://trans.info/ru/transportno-logisticheskiy-potentsial-kazahstana-rastet-strana-mozhet-stat-glavnyim-zvenom-koridora-aziya-es-331337.
3. *By water and land. Kazakhstan expands the network of alternative transport corridors*. 05 October 2023. Available at: https://primeminister.kz/ru/news/po-vode-i-sushe-v-kazakhstane-rasshiryayut-set-alternativnykh-transportnykh-koridorov-25794.
4. *How Experts Assess Kazakhstan's Transit Potential*. March 14, 2023. Available at: https://kpmg.com/kz/ru/home/insights/2023/03/transport-potential.html.
5. Fillingham, Z. *The “Belt and Road” in 10 years: a paradigm shift in financing development?* November 1, 2023. Available at: https://www.geopoliticalmonitor.com/belt-and-road-at-10-a-paradigm-shift-in-development-finance/.

6. Umirzakova, D.K. Perspectives of development of transcaspian international transport corridor. *Research Reviews.* December 26-27, 2022. P. 169-172. Prague, Czech Republic. DOI: 10.5281/zenodo.7489910. https://ojs.publisher.agency/index.php/RR/issue/view/12/36.
7. *On Approval of the Concept of Development of Transport and Logistics Potential of the Republic of Kazakhstan until 2030.* Resolution of the Government of the Republic of Kazakhstan dated December 30, 2022. No. 1116. Available at: https://adilet.zan.kz/rus/docs/P2200001116.
8. *Reference – Trans-Caspian International Transport Route (Middle Corridor).* October 24, 2022. Available at: https://www.portseurope.com/reference-trans-caspian-international-transport-route-also-known-as-the-middle-corridor/.
9. Raimbekov, Zh. & Syzdykbayeva, B. & Zhenskhan, D. & Bayneeva, P. & Amirbekuly, Y. Study of the state of logistics in Kazakhstan: Prospects for development and deployment of transport and logistics centers. *Transport Problems*. Dec 2016. Vol. 11(4). P. 57-71. DOI: 10.20858/tp.2016.11.4.6.
10. Myrzakhmetova, A.M. Analysis of the transport industry of Kazakhstan in modern conditions. Vestnik. *Series of international relations and international law*. 2018. No. 3(83). Available at: https://bulletin-ir-law.kaznu.kz/index.php/1-mo/article/view/813/789.
11. Balgabekov, T.K. *Transport systems and transportation process: textbook*. Kazakh Agrotechnical University named after S. Seyfullin, Nur-Sultan 2019. 140 p. Available at: https://repository.kazatu.kz/jspui/bitstream/123456789/1236/1/BalgabekovTK_TS.pdf.
12. *Comparison of investment policies in transportation infrastructure around the world*. Available at: https://stats.oecd.org/Index.aspx?DataSetCode=ITF_INV-MTN_DATA.
13. Huseynov E. *The Belt and Road and Global Gateway Initiatives: Prospects and Opportunities for Central Asian Countries*. November 30, 2023. Central Asian Bureau for Analytical Reporting. Available at: https://cabar.asia/ru/initsiativy-poyas-i-put-i-globalnye-vorota-perspektivy-i-vozmozhnosti-dlya-stran-tsentralnoj-azii.
14. *Analytical Review and Conceptual Proposals on Formation of the Comprehensive Development Plan of the Transport and Logistics Complex of Kazakhstan until 2030*. Kazlogistics. Corporate Foundation. Nur-Sultan. 2020. Available at: https://www.kazlogistics.kz/upload/iblock/fd2/fd2133ee4090c40a585465074bc8b11e.pdf.
15. Taisarinova, A. & Loprenzipe, D. & Yunusova, M. *The Evolution of the Kazakhstani Silk Road Section from a Transport into a Logistics Corridor and the Economic Sustainability of Regional Development in Central Asia*. August 2020. Available at: https://www.mdpi.com/2071-1050/12/15/6291.
16. *Kazakhstan Capitalizes on Geopolitical Shifts to Emerge as Eurasia's Transport and Logistics Hub.* Assel Satubaldina in Business, International on 17 November 2023, The Astana Times Brining Kazakhstan to The World. Available at: https://astanatimes.com/2023/11/kazakhstan-capitalizes-on-geopolitical-shifts-to-emerge-as-eurasias-transport-and-logistics-hub/.